
DAMAGE INDUCED BY A PROTON BEAM IN AN IRON WINDOW EVALUATED FROM RECENT GSI

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For hybrid reactors, one of the critical points is the window between the accelerator (where the intense proton beam is produced under vacuum) and the spallation target inside the subcritical reactor. Actually, it is a barrier between the reactor and the accelerator. The important question to know, up to which extent the accelerator will have to be included in the last safety barrier rely on the detailed knowledge of its resistance under extreme conditions.

The beam will induce heat deposition and nuclear reactions leading to the accumulation of new chemical species which could be responsible for a loss of cohesion of alloy and embrittlement of the window. Furthermore, damages will occur because of atom displacements due to the recoiling nuclei produced by the spallation process.

The favorite materials proposed by metallurgists are ferro-martensitics steels (T91 or EM10) with about 90

These numbers will be presented and compared to calculations performed with an old spallation model (Bertini-Dresner) and with a recent one (INCL4-ABLA) showing to which extent one can rely on them for this type of predictions in this region of target mass.